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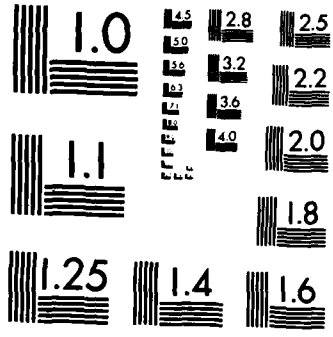

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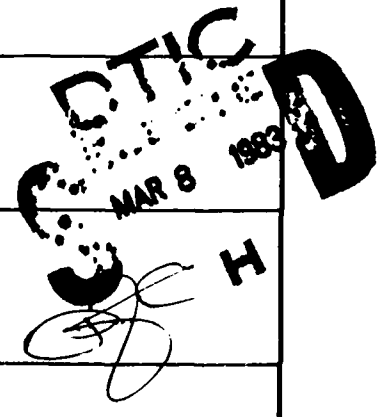

18. SUPPLEMENTARY NOTES

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Drosophila melanogaster
Sex-Linked Recessive Lethal Assay
Computer Assisted Data Storage and Retrieval

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report deals with the use of a computer for recording, storing and retrieving data generated from the Drosophila melanogaster Sex-Linked Recessive Lethal Assay.

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TECHNICAL NOTE NO. 82–42TN

COMPUTER ASSISTED DATA STORAGE AND RETRIEVAL IN MUTAGENICITY TESTING

II. The *Drosophila melanogaster* Sex-linked Recessive Lethal Assay

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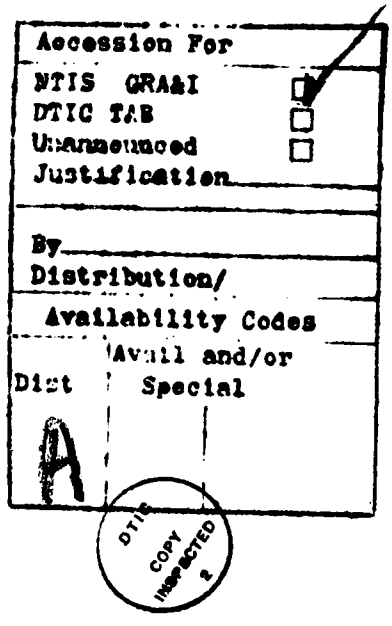
Computer-Assisted Data Storage and Retrieval in Mutagenicity Testing. II. The Drosophila melanogaster sex-linked recessive lethal assay --Jederberg and Powers

PREFACE

This technical note is the second in a series on the utilization of the computer facilities at Letterman Institute of Research to assist in mutagenicity testing as part of the institute's toxicology program. This report details the use of the computer in recording, storing and retrieving data. Its use in the Drosophila melanogaster sex-linked recessive lethal assay provides a form in which it is easy to view the raw data.



ACKNOWLEDGMENTS

The authors wish to express their appreciation to the Information Sciences Group, Letterman Army Institute of Research, for making computer facilities available and to all those who have made suggestions for improving the utility of the program described herein.

COMPUTER-ASSISTED DATA STORAGE AND RETRIEVAL IN MUTAGENICITY TESTING. II. The *Drosophila melanogaster* Sex-Linked Recessive Lethal Assay.

The mutagenicity testing of materials in compliance with federal regulations (4) requires several standards. Among these are the implementation of an extensive labelling system. A computer-assisted system has been established and described (2). Regulations also require storage of data. A computer program has been developed that records these new data from the Sex-Linked Recessive Lethal Assay (3), stores it in permanent computer files, and allows the user to see the data by means of a "print-out copy" as they are stored. The data also can be retrieved easily. Other programs which allow for a formatted print-out of a selected data set will also be described.

PROGRAM DESCRIPTION

The program DROSTOXDATA (Appendix A) records the raw data and stores it in the file DROSDATA. It records the number of failures, lethals and non-lethal offspring from each individual numbered male that was exposed to negative controls, positive controls, and test compounds. This recording is done for each of the four broods. In addition, the program makes a provision under the category of lethals so that the user may designate whether lethals are single or multiple. For each individual numbered male the program totals the number of failures, lethals (single or multiple), non-lethals, number of tests performed, and the mutation frequency. The program checks the total single and multiple lethals against the total as given by the individual broods. If they do not agree, an error message wil appear and the user may re-enter the number of single and multiple lethals. If the total number of failures, lethals, and non-lethals for a given brood is greater than 99, only the brood data will be requested to be re-entered. As seen in the sample (Figure 1), the program displays the last run experiment number and the last male for which data were recorded.

The program requests the following information from the user (Figure 1):

(1) Select if more data from the same run are to be entered or if data for a new run are to be entered.

(2) Specify the run number if data for a new run are to be entered.

(3) Enter the identification number for each male fly tested. (The user is allowed up to 6 characters of any type.)

(4) Enter the identification of the compound tested. (The user is allowed up to 6 characters of any type.).

(5) Enter the data for the first brood as to the number of failures, lethals, and non-lethals. (If anything is greater than 99, an error message will be displayed and the user must re-enter the data for that brood. This procedure is repeated for broods 2 through 4).

If lethals are present:

(6) Enter the total number of single lethals.

(7) Then, enter the total number of multiple lethals. (The computer program will check the total number of single and multiple lethals against the total lethals in the broods. If there is an error, and error message will be displayed and the user will be requested to re-enter the number of singl and multiple lethals. When total lethals agree, or there are none, the computer will type: TOTAL FAILURES, TOTAL LETHALS, TOTAL NON-LETHALS, TOTAL TESTS, and MUTATION RATE for data that have been entered.

(8) The user at this point may view how the data have been entered. If any of these data are incorrect the user may so indicate and return to Step 1.

(9) The user may then decide to continue by entering more data; beginning a new run or terminating the program.

(10) The user may log off the program and the data are stored in the DROSDATA file or the user may create a new file name to store the data.

(11) The user may receive a print-out of the data in their "raw" form (Figure 2), by giving the appropriate command to the operating system.

In addition, the user may receive a formatted print-out of the data accumulated by DROSTOXDATA by executing the program DROSRPT (Figure 3). This formatted print-out (Figure 4) is generated from DROSRPT and its associated subroutines RDDROSDATA, WRDROSDATA, and STRING (Appendices B, C, D and E).

The program, DROSRPT, requests the following information from the

user (Figure 3):

(1) Type in the date; day, month, and year the program is being executed.

(2) Type in the name of the file to be printed out.

(3) Type in the appropriate command to the selected operating system name to receive a print-out of the data in the formatted form (Figure 4).

DISCUSSION

By utilizing these programs and the subroutines presented in this report, the raw data may be presented in a form which is easy to view and which saves time in analysis.

CONCLUSION

None.

RECOMMENDATION

None.

SAMPLE RUN OF X DROSTOXDATA

(Underlined entries are sample user inputs)

```
) X DROSTOXDATA

The computer will type:

          LETTERMAN ARMY INSTITUTE OF RESEARCH
          TOXICOLOGY GROUP:  DROSOPHILA DATA

LAST RUN NUMBER RECORDED WAS:  37
LAST MALE DATA RECORDED WAS:  T2-904

          WOULD YOU LIKE:
               TO ENTER MORE DATA FOR THE SAME RUN (= 1) ?
               TO ENTER DATA FOR A NEW RUN (= 2) ?

ENTER CHOICE: (1 or 2)
          1

MALE IDENTIFIER (AN/6) - ??
     T2-905

TEST COMPOUND (AN/6) = ??
          002MPT

ENTER FIRST BROOD DATA:
FAILURES (0-99), LETHALS (0-99), NONLETHALS (0-99):
     1,0,24

ENTER SECOND BROOD DATA:
FAILURES (0-99), LETHALS (0-99), NONLETHALS (0-99):
     0,0,25

ENTER THIRD BROOD DATA:  FAILURES (0-99), LETHALS (0-99), NONLETHALS
(0-99):
     0,1,24

ENTER FOURTH BROOD DATA:  FAILURES (0-99), LETHALS (0-99), NONLETHALS
(0-99):
     0,1,25

HOW MANY LETHALS WERE SINGLE ? (0-99)
     1
```

Figure 1. Sample Run of X DROSTOXDATA

```
HOW MANY LETHALS WERE MULTIPLE ? (0-99)
     0

                ********************ERROR********************
                TOTAL LETHALS DON'T AGREE:
                TOTAL LETHALS FROM BROODS = XX
                TOTAL FROM SINGLES + MULTIPLES = XX

TOTAL FAILURES: 1   TOTAL LETHALS:  1
TOTAL NONLETHALS:  98   TOTAL TESTS:  99
MUTATION RATE FOR THESE DATA:1.01

37 T2 905 002MPT 0,1,24 0,0,25 0,1,24 0,0,25 1 101 98 99 1.01

ARE THE DATA ALL RIGHT ? ( 1=YES, 0=NO)
          1

          WOULD YOU LIKE:
               TO ENTER MORE DATA FOR THE SAME RUN (= 1)?
               TO ENTER DATA FOR A NEW RUN (= 2) ?
               TO ENTER NO MORE DATA (= 3) ?
               ENTER CHOICE: 1, 2, OR 3.  1

          )
```

Figure 1. Sample Run of X DROSTOXDATA

37	C1	906	1%FRUT	0	025	0	025	0	025	0	025	0	0	0	0	100	100	.00
37	C1	907	1%FRUT	0	025	0	025	0	025	0	025	0	0	0	0	100	100	.00
37	C1	908	1%FRUT	0	025	1	024	1	021	0	025	2	0	0	0	95	95	.00
37	C1	909	1%FRUT	1	024	0	025	0	124	0	025	1	1	0	1	98	99	1.01
37	C1	910	1%FRUT	1	024	1	024	0	025	0	025	2	0	0	0	98	98	.00
37	C1	911	1%FRUT	0	025	0	025	0	025	0	025	0	0	0	0	100	100	.00
37	C1	912	1%FRUT	0	025	0	025	1	024	0	025	1	0	0	0	99	99	.00
37	C1	913	1%FRUT	0	025	0	025	0	025	1	021	1	0	0	0	96	96	.00
37	P1	889	1EMST	2	419	1	222	0	520	0	0	0	3	11	011	61	72	15.28
37	P1	890	1EMST	0	421	0	223	0	223	1	0	4	1	8	0	8	71	79	10.13
37	P1	891	1EMST	0	223	0	124	1	222	0	0	0	1	5	0	5	69	74	6.76
37	P1	892	1EMST	0	124	0	421	0	025	0	0	0	0	5	0	5	70	75	6.67
37	P1	893	1EMST	0	421	0	421	0	124	0	111	0	10	0	10	77	87	11.49
37	P1	894	1EMST	2	023	1	321	0	124	0	0	0	3	4	0	4	68	72	5.56
37	P1	895	1EMST	1	321	3	022	8	215	0	0	0	12	5	0	5	58	63	7.94
37	P1	896	1EMST	1	519	0	124	0	619	0	0	0	1	12	0	12	62	74	16.22
37	P1	897	1EMST	0	223	2	122	1	321	0	0	0	3	6	0	6	66	72	8.33
37	P1	898	1EMST	1	222	0	223	0	223	0	0	0	1	6	0	6	68	74	8.11
37	T1	889	005MPT	0	025	0	025	0	025	0	025	0	0	0	0	100	100	.00
37	T1	890	005MPT	0	025	0	025	1	024	0	025	1	0	0	0	99	99	.00
37	T1	891	005MPT	0	025	0	025	0	025	0	025	0	0	0	0	100	100	.00
37	T1	892	005MPT	0	025	0	025	0	025	0	025	0	0	0	0	100	100	.00
37	T1	893	005MPT	0	025	0	025	0	025	1	024	1	0	0	0	99	99	.00
37	T1	894	005MPT	0	025	3	121	0	025	0	025	3	1	0	1	96	97	1.03
37	T1	895	005MPT	0	025	0	025	0	025	0	025	0	0	0	0	100	100	.00
37	T1	896	005MPT	0	025	0	025	1	116	0	020	1	1	0	1	86	87	1.15
37	T1	897	005MPT	0	025	0	025	1	024	0	016	1	0	0	0	90	90	.00
37	T1	898	005MPT	1	024	0	025	0	025	0	025	1	0	0	0	99	99	.00
37	T1	899	005MPT	0	025	0	025	0	025	0	020	0	0	0	0	95	95	.00
37	T1	900	005MPT	1	024	0	025	0	025	0	025	1	0	0	0	99	99	.00
37	T1	901	005MPT	0	025	0	025	0	025	0	025	0	0	0	0	100	100	.00
37	T1	902	005MPT	0	025	2	023	0	025	0	025	2	0	0	0	98	98	.00
37	T1	903	005MPT	1	024	0	0	0	0	0	0	0	1	0	0	0	24	24	.00
37	T1	904	005MPT	0	025	0	025	0	025	1	024	1	0	0	0	99	99	.00
37	T1	905	005MPT	1	024	0	025	1	024	0	025	2	0	0	0	98	98	.00
37	T1	906	005MPT	0	025	0	025	0	025	0	025	0	0	0	0	100	100	.00
37	T1	907	005MPT	0	025	0	025	0	025	1	024	1	0	0	0	99	99	.00
37	T1	908	005MPT	0	025	1	024	0	025	1	018	2	0	0	0	92	92	.00
37	T1	909	005MPT	0	025	0	0	0	0	0	0	0	0	0	0	25	25	.00
37	T1	910	005MPT	0	025	0	025	0	025	0	025	0	0	0	0	100	100	.00
37	T1	911	005MPT	1	024	0	025	0	025	0	025	1	0	0	0	99	99	.00
37	T1	912	005MPT	2	023	0	025	0	025	0	025	2	0	0	0	98	98	.00
37	T1	913	005MPT	3	022	0	025	0	0	0	0	0	3	0	0	0	47	47	.00
37	T2	889	002MPT	5	020	0	025	0	025	0	025	5	0	0	0	95	95	.00
37	T2	890	002MPT	0	025	0	025	0	025	0	0	0	0	0	0	84	84	.00
37	T2	891	002MPT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.00
37	T2	892	002MPT	0	015	0	025	0	025	1	024	1	0	0	0	89	89	.00
37	T2	893	002MPT	0	020	0	025	0	025	0	025	0	0	0	0	95	95	.00
37	T2	894	002MPT	1	064	14	011	0	025	0	025	15	0	0	0	85	85	.00
37	T2	895	002MPT	0	025	1	024	0	010	0	0	0	1	0	0	0	59	59	.00
37	T2	896	002MPT	0	025	0	0	0	0	0	0	0	0	0	0	0	25	25	.00
37	T2	897	002MPT	1	024	0	0	0	0	0	0	0	1	0	0	0	49	49	.00
37	T2	898	002MPT	1	024	0	025	0	025	0	025	1	0	0	0	99	99	.00
37	T2	899	002MPT	0	025	0	025	0	025	0	025	0	0	0	0	100	100	.00
37	T2	900	002MPT	0	025	0	025	0	025	0	0	0	0	0	0	83	83	.00
37	T2	901	002MPT	0	025	0	025	0	025	1	024	1	0	0	0	99	99	.00
37	T2	902	002MPT	0	025	0	025	0	025	0	025	0	0	0	0	100	100	.00
37	T2	903	002MPT	5	022	0	025	0	025	0	025	5	0	0	0	97	97	.00
37	T2	904	002MPT	0	025	0	025	0	025	0	025	0	0	0	0	100	100	.00
37	T2	905	002MPT	1	024	0	025	0	025	0	025	1	1	0	1	98	99	1.01
37	T2	906	002MPT	0	025	0	0	0	0	0	0	0	0	0	0	0	0	.00
37	T2	907	002MPT	0	025	1	024	0	025	0	025	1	0	0	0	99	99	.00

Figure 3. Raw Data of X_GROSTOXDATA

SAMPLE RUN OF X DROSRPT

(Underlined entries are sample user inputs)

) X DROSRPT

The computer will type:

ENTER DATA TO APPEAR ON REPORT (XXMONXX). 10Jun82

The computer will type:

NAME OF FILE TO BE REPORTED: DROSDATA

The computer will type:

REPORT READY IN `SLRRPT'

)

Figure 3. Sample Run of X DROSRPT

LETTERMAN ARMY INSTITUTE OF RESEARCH
SEX-LINKED RECESSIVE LETHAL DROSOPHILA ASSAY
(RAW DATA PRINT-OUT)

DATE: 100ct82 PAGE: 30

NO:	MALE:	COMPOUND:	#1000 #11 FS:	LS:	NLS:	#1000 #21 FS:	LS:	NLS:	#1000 #31 FS:	LS:	NLS:	#1000 #41 FS:	LS:	NLS:	SUMMARY TOTALS TF	SL	ML	TL	TNL	TOTAL TESTS:	MUTATION RATE (%)
37	T2 896	002MPT	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	0	25	25	.00
37	T2 897	002MPT	1	0	24	0	0	0	0	0	0	0	0	25	1	0	0	0	49	49	.00
37	T2 898	002MPT	1	0	24	0	0	25	0	0	25	0	0	25	1	0	0	0	99	99	.00
37	T2 899	002MPT	0	0	25	0	0	25	0	0	25	0	0	25	0	0	0	0	100	100	.00
37	T2 900	002MPT	0	0	25	0	0	25	0	0	25	0	0	8	0	0	0	0	83	83	.00
37	T2 901	002MPT	0	0	25	0	0	25	0	0	25	1	0	24	1	0	0	0	99	99	.00
37	T2 902	002MPT	0	0	25	0	0	25	0	0	25	0	0	25	0	0	0	0	100	100	.00
37	T2 903	002MPT	3	0	22	0	0	25	0	0	25	0	0	25	3	0	0	0	97	97	.00
37	T2 904	002MPT	0	0	25	0	0	25	0	0	25	0	0	25	0	0	0	0	100	100	.00
37	T2 905	002MPT	1	0	24	0	0	25	0	1	24	0	0	25	1	1	0	1	98	99	1.01
37	T2 906	002MPT	0	0	25	0	0	25	0	0	25	0	0	25	0	0	0	0	100	100	.00
37	T2 907	002MPT	0	0	25	1	0	24	0	0	25	0	0	25	1	0	0	0	99	99	.00
37	T2 908	002MPT	1	0	24	0	0	25	0	0	15	0	0	7	1	0	0	0	71	71	.00
37	T2 909	002MPT	0	0	25	0	0	25	0	0	25	0	0	25	0	0	0	0	100	100	.00
37	T2 910	002MPT	0	0	25	0	0	25	0	0	25	0	0	17	0	0	0	0	92	92	.00
37	T2 911	002MPT	0	0	25	1	0	24	0	0	25	0	0	9	1	0	0	0	83	83	.00
37	T2 912	002MPT	0	0	25	0	0	25	0	0	25	0	0	20	0	0	0	0	95	95	.00
37	T2 913	002MPT	0	0	25	0	1	24	0	0	25	1	0	21	1	1	0	1	95	96	1.04
38	C1 914	13FHUT	1	0	24	0	0	25	0	0	25	0	0	25	1	0	0	0	99	99	.00
38	C1 915	13FHUT	1	0	24	0	0	25	0	0	25	0	0	25	1	0	0	0	99	99	.00
38	C1 916	13FHUT	1	0	24	1	0	24	0	0	25	0	0	18	2	0	0	0	91	91	.00
38	C1 917	13FHUT	0	0	25	0	0	25	0	0	25	0	0	25	0	0	0	0	100	100	.00
38	C1 918	13FHUT	0	0	25	0	0	25	0	0	25	0	0	25	0	0	0	0	100	100	.00

EXPLANATORY NOTES: FS=FAILURES, LS=LETHALS, NLS=NONLETHALS
TF=TOTAL FAILURES, SL=SINGLE LETHALS, ML=MULTIPLE LETHALS, TL=TOTAL LETHALS,
TNL=TOTAL NONLETHALS

Figure 4. Formatted Data of X DROSRPT

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2. JEDERBERG, W.W., R.A. WIRTZ and N.R. POWERS. Computer-Assisted Labelling in Mutagenicity Testing I. The Drosophila melanogaster Sex-Linked Recessive Lethal Assay. Technical Note No. 82-32TN, Letterman Institute of Research, Presidio of San Francisco, CA 94129, March 1982.

3. WIRTZ, R.A., N.R. POWERS and J.T. FRUIN. Mutagenicity Testing using the Drosophila melanogaster Sex-linked Recessive Lethal Assay. Institute Report No. 112, Letterman Army Institute of Research, Presidio of San Francisco, CA 94129, February 1982.

APPENDICES

Appendix A.

```
C --- PROGRAM NAME:  DROSTOXDATA.FR
C --- WRITTEN BY:    WARREN W JEDERBERG, CUTANEOUS HAZARDS
C --- INPUT:         AT TIME OF EXECUTION
C --- FORMAT FOR INPUT:  DASHER OR CRT
C --- SPECIAL EQUIPMENT: NONE
C --- PURPOSE:       TO STORE DATA FROM THE SEX-LINKED RECESSIVE LETHAL
C ---         DROSOPHILA TOXICOLOGICAL TEST, AND ALLOW CHECKING THE DATA
C ---         BEFORE IT IS STORED IN "DROSDATA" FILE
C ---
      REAL MR
C --- MR = MUTATION RATE FOR THE DATA
      INTEGER MNUM, SL, TL, TNL, TT,  ML, CNAM, TTL
      DIMENSION CNAM(6),MNUM(6)
C --- MNUM = MALE INDENTIFICATION
C --- SL   = SINGLE LETHALS
C --- ML   = MULTIPLE LETHALS
C --- TL   = TOTAL LETHALS
C --- TNL  = TOTAL NONLETHALS
C --- TT   = TOTAL TESTS
C --- CNAM = COMPOUND INDENTIFIER
C ---
      INTEGER BFF,BFL,BFNL, BSF,BSL,BSNL, BTF,BTL,BTNL, BLF,BLL,BLNL
C --- BFF  = FIRST BROOD FAILURES
C --- BFL  = FIRST BROOD LETHALS
C --- BFNL = FIRST BROOD NONLETHALS
C ---
C --- BSF  = SECOND BROOD FAILURES
C --- BSL  = SECOND BROOD LETHALS
C --- BSNL = SECOND BROOD NONLETHALS
C ---
C --- BTF  = THIRD BROOD FAILURES
C --- BTL  = THIRD BROOD LETHALS
C --- BTNL = THIRD BROOD NONLETHALS
C ---
C --- BLF  = FOURTH BROOD FAILURES
C --- BLL  = FOURTH BROOD LETHALS
C --- BLNL = FOURTH BROOD NONLETHALS
C ---
C *** OUTPUT HEADER   ***
 99   WRITE (10,1)
 1    FORMAT (///,10X,"LETTERMAN ARMY INSTITUTE OF RESEARCH",/,10X,
     1"TOXICOLOGY GROUP:  DROSOPHILA DATA",//)
C ---
C *** GET DATA LAST RECORDED ***
      OPEN 2, "LDATA", ATT = "SIB"
      READ (2,11) NR, MNUM
      CLOSE 2
```

```
  11  FORMAT (I4,1X,6A1)
      WRITE (10,12) NR, MNUM
  12  FORMAT (1X,"LAST RUN NUMBER RECORDED WAS:",2X,I4,/,
     11X,"LAST MALE DATA RECORDED WAS:",2X,6A1,//)
C ---
C *** OPTIONS (SAME RUN = 1, NEW RUN = 2) ***
  301 CONTINUE
      WRITE (10,13)
  13  FORMAT (10X," WOULD YOU LIKE:",/,15X,
     1"TO ENTER MORE DATA FOR THE SAME RUN (= 1) ?",/,15X,
     2"TO ENTER DATA FOR A NEW RUN (= 2) ?",//)
      ACCEPT " ENTER CHOICE: 1 OR 2 ",K
      IF (K.NE.1.AND.K.NE.2) GO TO 301
      IF (K.NE.2) GO TO 101
C ---
C *** GET NEW RUN NUMBER ***
  999 CONTINUE
      TYPE
      ACCEPT "  NEW RUN NUMBER ? ",NR
      IF (NR.LE.9999) GO TO 101
      TYPE
      TYPE " ++++++++++ERROR++++++++++"
      TYPE "    RUN NUMBER > 9999"
      GO TO 999
  101 CONTINUE
C ---
C *** GET MALE IDENTIFIER ***
      TYPE
      TYPE "  MALE IDENTIFIER (AN/6)= ??"
      READ (11,8) (MNUM(K), K=1,6)
   8  FORMAT (6A1)
C ---
C *** GET COMPOUND IDENTIFIER ***
      TYPE
      TYPE "  TEST COMPOUND (AN/6)= ??"
      READ (11,7) (CNAM(K), K=1,6)
   7  FORMAT (6A1)
C ---
C *** ENTER BROOD DATA
   2  FORMAT (/,"ENTER FIRST BROOD DATA:")
   3  FORMAT (/,"ENTER SECOND BROOD DATA:")
   4  FORMAT (/,"ENTER THIRD BROOD DATA:")
   5  FORMAT (/,"ENTER FOURTH BROOD DATA:")
   6  FORMAT ("FAILURES (0-99), LETHALS (0-99), NONLETHALS (0-99):")
C ---
```

Appendix A.
(Continued)

```
C --- ENTER FIRST BROOD DATA
 10   WRITE (10,2)
      WRITE (10,6)
      ACCEPT "*", BFF,BFL,BFNL
      IF (BFF.GT.99.OR.BFL.GT.99.OR.BFNL.GT.99) GO TO 10
C ---
C --- ENTER SECOND BROOD DATA
 20   WRITE (10,3)
      WRITE (10,6)
      ACCEPT "*", BSF,BSL,BSNL
      IF (BSF.GT.99.OR.BSL.GT.99.OR.BSNL.GT.99) GO TO 20
C ---
C --- ENTER THIRD BROOD DATA
 30   WRITE (10,4)
      WRITE (10,6)
      ACCEPT "*", BTF,BTL,BTNL
      IF (BTF.GT.99.OR.BTL.GT.99.OR.BTNL.GT.99) GO TO 30
C ---
C --- ENTER FOURTH BROOD DATA
 40   WRITE (10,5)
      WRITE (10,6)
      ACCEPT "*", BLF,BLL,BLNL
      IF (BLF.GT.99.OR.BLL.GT.99.OR.BLNL.GT.99) GO TO 40
C ---
C *** CALCULATE TOTALS ***
      ML = 0.00
      SL = 0.00
      TL = BFL + BSL + BTL + BLL
      IF (TL.LE.0.1) GO TO 150
      TYPE
      TYPE
 50   TYPE " HOW MANY LETHALS WERE SINGLE ? (0-99)"
      ACCEPT "*",SL
      TYPE " HOW MANY LETHALS WERE MULTIPLE ? (0-99)"
      ACCEPT "*",ML
C ---
C --- CHECK TOTAL LETHALS FROM BROODS AND FROM QUERY
      TTL = SL + ML
      IF (ABS(TTL-TL).LE.0.1) GO TO 150
      TYPE
      TYPE "**********ERROR**********"
      TYPE " TOTAL LETHALS DON'T AGREE:"
      TYPE " TOTAL LETHALS FROM BROODS = ",TL
      TYPE " TOTAL FROM SINGLES + MULTIPLES = ",TTL
      TYPE
      GO TO 50
```

```
 150  CONTINUE
      TNL = BFNL + BSNL + BTNL + BLNL
      TT = TNL + TL
      IF (TT.LE.100) GO TO 60
      TYPE "*****************ERROR***************"
      TYPE "TOTAL TESTS ARE MORE THAN 100, RE-ENTER ALL DATA"
      GO TO 99
 60   CONTINUE
      MR = TL*(100.00/TT)
      TF = BFF + BSF + BTF + BLF
C ---
C *** CHECK DATA ****
C --- DISPLAY CALCULATED DATA ***
      WRITE (10,70) TF,TL,TNL,TT,MR
 70   FORMAT (/,"TOTAL FAILURES:",1X,I3,2X,"TOTAL LETHALS:",1X,I3,/,
     1"TOTAL NONLETHALS:",1X,I3,2X,"TOTAL TESTS:",1X,I3,/,
     2"MUTATION RATE FOR THESE DATA:",2X,F6.2)
C --- DATA AS WILL BE RECORDED
      WRITE (10,80)
 80   FORMAT (//,"DATA WILL BE RECORDED AS:")
      WRITE (10,100) NR,MNUM,CNAM,BFF,BFL,BFNL,BSF,BSL,BSNL,
     1BTF,BTL,BTNL,BLF,BLL,BLNL,TF,SL,ML,TL,TNL,TT,MR
      TYPE
 81   TYPE "ARE THE DATA ALL RIGHT ? (1=YES,0=NO)"
      ACCEPT "*",I
      IF (I.NE.0.AND.I.NE.1) GO TO 81
      IF (I.NE.1) GO TO 99
C ---
C *** STORE DATA IN DROSDATA  ***
      OPEN 1, "DROSDATA", ATT = "SA"
      WRITE (1,100) NR,MNUM,CNAM,BFF,BFL,BFNL,BSF,BSL,BSNL,
     1BTF,BTL,BTNL,BLF,BLL,BLNL,TF,SL,ML,TL,TNL,TT,MR
 100  FORMAT (I4,1X,6A1,1X,6A1,4(1X,3I2),1X,I2,1X,3I2,
     12(1X,I3),1X,F6.2)
      CLOSE 1
C ---
C *** RECORD LAST RUN NUMBER AND MALE IN LDATA
      OPEN 2, "LDATA", ATT = "SO"
      WRITE (2,11) NR, MNUM
      CLOSE 2
C ---
```

Appendix A.
(Continued)

```
C *** OPTION FOR MORE DATA OR LOG OFF ***
  200 CONTINUE
      WRITE (10,14)
   14  FORMAT (//,10X,"WOULD YOU LIKE:",/,15X,
     1"TO ENTER MORE DATA FOR THE SAME RUN (= 1) ?",/,15X,
     2"TO ENTER DATA FOR A NEW RUN (= 2) ?",/,15X,
     3"TO ENTER NO MORE DATA (= 3) ?",/)
      ACCEPT " ENTER CHOICE: 1, 2, OR 3 ",K
      IF (K.NE.1.AND.K.NE.2.AND.K.NE.3) GO TO 200
      IF (K.NE.2.AND.K.NE.3) GO TO 101
      IF (K.NE.3) GO TO 999
C ---
      END
```

Appendix B.

```
C *** PROGRAM NAME:          DROSRPT.FR
C *** WRITTEN BY:            WARREN JEDERBERG
C *** PURPOSE:               TO GENERATE A REPORT OF THE
C ***         RAW DATA AS STORED IN 'DROSDATA'

      INTEGER NR,MNUM,CNAM,BFF,BFL,BFNL,BSF,BSL,BSNL,
     1BTF,BTL,BTNL,BLF,BLL,BLNL,TF,SL,ML,TL,TNL,TT,SFNAM

      REAL MR

      COMMON/DREC/NR,MNUM(6),CNAM(6),BFF,BFL,BFNL,BSF,BSL,BSNL,
     1BTF,BTL,BTNL,BLF,BLL,BLNL,TF,SL,ML,TL,TNL,TT,MR

      LOGICAL EOF


      DIMENSION NATE(5),SFNAM(20)

C --- GET REPORT DATE

      TYPE "Enter Date to appear on report: (XX-MON-XX)"
      READ (11,400) (NATE(I),I=1,5)
  400 FORMAT (5A2)

C --- INITIALIZE PAGE AND LINE
      PAGE = 0
      LINE = 0


C --- INITIALIZE EOF
      EOF = .FALSE.

C --- GET AND OPEN FILE TO BE REPORTED
      WRITE (10,300)
  300 FORMAT (/"NAME OF FILE TO BE REPORTED: ",Z)
      READ (11,310) SFNAM
  310 FORMAT (20A2)
      CALL STRING (SFNAM,20)
      OPEN 1, SFNAM, ATT="SIB",ERR=100
      READ (1,1)
    1 FORMAT (/)
      GO TO 120
  100 CONTINUE
      WRITE (10,6) SFNAM
    6 FORMAT (//,"**** ERROR **** ERROR **** ERROR ****",/,
     14X,"FILE ",20A2," NOT FOUND . . .")
      STOP
```

Appendix B.
(Continued)

```
C --- DELETE OLD REPORT
      DELETE "SLRRPT"

C --- OPEN REPORT FILE SLRRPT
  120 OPEN 2, "SLRRPT", ATT = "SOP"

C --- READ DATA RECORD
  140 CALL RDDROSDATA (EOF)
      IF(EOF) GO TO 220

C --- REPORT DATA

      CALL WRDROSDATA (LINE,PAGE,NATE(1))
      GO TO 140

C --- EOF DETECTED
  220 CLOSE 1
      IF (LINE.NE.0.OR.PAGE.NE.0) GO TO 250
      TYPE
      TYPE " EMPTY DATA FILE"
      CLOSE 2
      STOP

  250 CLOSE 2
      TYPE
      TYPE " REPORT READY IN 'SLRRPT'"
      END
```

Appendix C.

```
      COMPILER NOSTACK
C *** PROGRAM NAME:          RDDROSDATA.FR
C *** WRITTEN BY:            WARREN JEDERBERG
C *** PURPOSE:               TO READ DATA FOR MAKING REPORTS
C ***        FOR THE SLRL-DROSOPHILA ASSAY

      SUBROUTINE RDDROSDATA (EOF)
      COMMON/DREC/NR,MNUM(6),CNAM(6),BFF,BFL,BFNL,BSF,BSL,BSNL,
     1BTF,BTL,BTNL,BLF,BLL,BLNL,TF,SL,ML,TL,TNL,TT,MR

      INTEGER NR,MNUM,CNAM,BFF,BFL,BFNL,BSF,BSL,BSNL,BTF,BTL,BTNL,
     1BLF,BLL,BLNL,TF,SL,ML,TL,TNL,TT

      REAL MR

      LOGICAL EOF

      READ (1,100, END= 120) NR,MNUM,CNAM,BFF,BFL,BFNL,BSF,BSL,BSNL,
     1BTF,BTL,BTNL,BLF,BLL,BLNL,TF,SL,ML,TL,TNL,TT,MR

  100 FORMAT(I4,1X,6A1,1X,6A1,4(1X,3I2),1X,I2,1X,3I2,
     12(1X,I3),1X,F6.2)
      RETURN

  120 EOF = .TRUE.
      RETURN
      END
```

Appendix D.

```
C *** PROGRAM NAME:          WRDROSDATA.FR
C *** WRITTEN BY:            WARREN JEDERBERG
C *** PURPOSE:               THIS SUBROUTINE HANDLES PAGING AND
C ***         OUTPUTTING OF RECORDS FOR DROSRPT.

      SUBROUTINE WRDROSDATA (LINE,PAGE,IDATE)
      INTEGER NR,MNUM,CNAM,BFF,BFL,BFNL,BSF,BSL,BSNL,BTF,BTL,BTNL,
     1BLF,BLL,BLNL,TF,SL,ML,TL,TNL,TT


      DIMENSION IDATE(5)
      REAL MR


      COMMON/DREC/NR,MNUM(6),CNAM(6),BFF,BFL,BFNL,BSF,BSL,BSNL,BTF,BTL,
     1BTNL,BLF,BLL,BLNL,TF,SL,ML,TL,TNL,TT,MR
      IF (LINE.GT.0.AND.LINE.LT.54) GO TO 120


      PAGE=PAGE + 1
      WRITE (2,100) (IDATE(I),I=1,5), PAGE

  100 FORMAT (1H1,42X,"LETTERMAN ARMY INSTITUTE OF RESEARCH",
     1/,39X,"SEX-LINKED RECESSIVE LETHAL DROSOPHILA ASSAY",
     2/,50X,"(RAW DATA PRINT-OUT)",
     3//," DATE:",2X,5A2,94X,"PAGE:",1X,I3,
     4//,27X,"BROOD #1:    BROOD #2:    BROOD #3:    BROOD #4:",9X,
     5"SUMMARY TOTALS",4X,"TOTAL",4X,"MUTATION",/,
     61H+,26X,4(9("_"),4X),3X,19("_"),
     7/," RUN:",2X,"MALE:",2X,"COMPOUND:",4X,4("F: L: NL:",4X),3X,
     82X,"TF SL ML TL TNL",3X,"TESTS:",3X,"RATE (%)")

      LINE = 9


  120 WRITE (2,140) NR,MNUM,CNAM,BFF,BFL,BFNL,BSF,BSL,BSNL,
     1BTF,BTL,BTNL,BLF,BLL,BLNL,TF,SL,ML,TL,TNL,TT,MR

  140 FORMAT (/,I4,3X,6A1,1X,6A1,7X,4(3(I2,1X),4X),5X,4(I2,1X),I3,
     14X,I3,6X,F6.2)
      LINE = LINE + 2

      IF (LINE.GE.54) GO TO 150
      RETURN

  150 WRITE (2,160)
```

Appendix D.
(Continued)

```
160 FORMAT (/," EXPLANATORY NOTES: F=FAILURES, L=LETHALS, NL=NONLETHALS",/,
   12OX,"TF=TOTAL FAILURES, SL=SINGLE LETHALS, ML=MULTIPLE LETHALS, TL=",
   2"TOTAL LETHALS,",/,2OX,"TNL=TOTAL NONLETHALS",/)


    LINE=O
    RETURN

    END
```

Appendix E.

```
C --- TO CONVERT FILE NAMES TO USE IN OPEN STATEMENTS
      SUBROUTINE STRING(LINE,LLEN)
      COMPILER STATIC
      DIMENSION LINE (LLEN)
      DO 100 I=1,LLEN
      IF (LINE(I).EQ."  ") LINE(I)=0
      IF (FLD(LINE(I),9,16).EQ.FLD("  ",9,16))FLD(LINE(I),9,16)=0
  100 CONTINUE
      RETURN
      END
```

END

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